

### **3.1.**

## **AMBIENT BIOLOGICAL MONITORING**

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As part of the SWAT program, the Biological Monitoring Unit evaluates benthic macroinvertebrate communities of Maine streams and rivers to determine if they are impaired by toxic contamination. Benthic macroinvertebrates are animals without backbones that can be seen with the naked eye and live on the stream bottom, such as mayflies, stoneflies, caddisflies, crayfish, snails, and leeches. In 2005, we evaluated the condition of 39 sample locations, primarily in the Saco, Piscataqua, and Presumpscot River basins.

Table 3.1.1 summarizes the results of biological monitoring activities for the 2005 SWAT Program, sorted by waterbody name. Column headings of Table 3.1.1 are described below:

- *Station* – Since waterbodies are sometimes sampled in more than one location, each sampling location is assigned a unique “Station” number.
- *Log* – Each sample event is assigned a unique “Log” number.
- *Map* – The “Map” number refers to Maps 1 through 24, which are located after the tables.
- *Location* – Some Stations are located upstream or downstream of potential sources of pollution, which are called “Issues”.
- *Issue* – Issues are potential sources of pollution.
- *Statutory Class* – The state legislature has assigned a statutory class, either AA, A, B, or C, to every Maine stream and river. Class AA and A waterbodies shall support a “natural” biological community. Class B waterbodies shall not display “detrimental changes in the resident biological community”. Class C waterbodies shall “maintain the structure and function of the resident biological community”.
- *Model Class* – The Biological Monitoring Unit uses a multivariate statistical model, called BioME, to analyze a benthic macroinvertebrate sample and predict if a waterbody is attaining the biological criteria associated with its statutory class. The Model Class is the final determination of the BioME model. If a stream does not meet minimum state criteria, Class C, then the Model Class is non-attainment (NA). AA and A are treated the same in the model.
- *Attains Class* – “Y” is given if the Model Class is equal to or exceeds the Statutory Class. A Class B stream, for example, would receive a “Y” if its Model Class was either A or B. “N” is given if a stream does not attain its Statutory Class. A Class B stream, for example, would receive an “N” if its Model Class was either C or NA. A dash (“-”) is given if the sample was disturbed or provided insufficient information.
- *Probable Cause* – The probable cause column lists potential stressors to benthic macroinvertebrate communities, based on best professional judgement. In some cases, a probable cause may not be related to toxic pollution but instead to poor habitat conditions.

Data reports for each sampling event (Aquatic Life Classification Attainment Reports) are available in electronic format with the web version of this report. Supporting water chemistry data are given in Table 3.1.2. Water temperature data are given in Figure 3.1.1. For more information about the Biological Monitoring Unit, please e-mail us at [biome@maine.gov](mailto:biome@maine.gov) or visit our web site: <http://www.state.me.us/dep/blwq/docmonitoring/biomonitoring/index.htm>.

## **Results Summary**

- Thirty-nine stations were assessed for the condition of the benthic macroinvertebrate community.
- Fifteen of the thirty-nine stations (39 %) reported failed to attain the aquatic life standards of their assigned class.

## **Historical Notes**

(not all of the samples listed below were collected under the SWAT Program)

- Back Brook (Station 107) attained (exceeded) class in 1987.
- Birch Stream (Station 312) failed to attain class in 1997, 1999, 2001, 2003, and 2004.
- Branch Brook (Station 106) attained class in 1987 and failed to attain class in 2000.
- Brown Brook (Station 445) failed to attain class in 2000.
- Cascade Brook (Station 434) attained class in 2000.
- Cascade Brook (Station 435) attained (exceeded) class in 2000.
- Frost Gulley (Station 303) failed to attain class in 1998 and attained class in 2000.
- Frost Gulley (Station 304) failed to attain class in 1998 and attained class in 2000.
- Goosefare Brook (Station 271) failed to attain class in 1995, 1998, and 2000.
- Goosefare Brook (Station 337) attained class in 1998 and failed to attain class in 2000.
- Goosefare Brook (Station 48) attained class in 1984, 1986, 1994, 1995, 1998, and 2000.
- Great Works River (Station 439) attained class in 2000.
- Kennebunk River (Station 469) attained class in 2000.
- Kennebunk River (Station 270) attained class in 1995 and 2000.
- Little Ossipee River (Station 447) attained class in 2000.
- Little Ossipee River (Station 446) failed to attain class in 2000.
- Little River (Station 440) attained class in 2000.
- Martin Stream (Station 755) failed to attain class in 2004.
- Martin Stream (Station 756) failed to meet minimum abundance criteria in 2004. Resampled in 2005.
- Merriland River (Station 436) attained class in 2000.
- Merriland River (Station 437) attained class in 2000.
- Mousam River (Station 388) attained class in 1999.
- Mousam River (Station 259) failed to attain class in 1995 and attained class in 1999.
- Presumpscot River (Station 72) failed to attain class in 1984, 1994, 1995, and 1996.
- Red Brook (Station 219) attained class in 1994 and failed to attain class in 1999.
- Salmon Falls River (Station 52) failed to attain class in 1984, 1992, and 1995.
- Sheepscot River (Station 74) attained class in 1987, 1989, 1990, 1992, 1995, 1996, 1998, 1999, 2000, 2001, 2002, 2003, and 2004. It failed to attain class in 1984, 1985, 1986, 1988, 1991, 1993, 1994, and 1997.
- Stroudwater River (Station 240) attained class in 1992.
- Thatcher Brook (Station 451) attained class in 2000.
- Trout Brook (Station 675) failed to attain class in 2003 and 2004.
- Webhannet River (Station 438) attained class in 2000.
- West Branch Sheepscot River (Station 268) attained class in 1995, 1996, 1997, 1998, 1999, 2001, and 2002. It failed to attain class in 2000, 2003, and 2004.

**TABLE 3.1.1 - 2005 SWAT Benthic Macroinvertebrate Biomonitoring Results**

Name	Map	Station	Log	Town	Location	Issue <sup>1</sup>	Statutory Class/ Model Class	Attains Class?	Probable Cause <sup>1</sup>
Back Brook	1	107	1496	Limington		Reference	B / A (BPJ)	Y	
Birch Stream	2	312	1319	Bangor	downstream	Urban NPS; Airport	B / NA	N	NPS Toxics; Habitat
Branch Brook	3	106	1341	Sanford		NPS	A / B	N	
Brown Brook	4	445	1357	Limerick		Munic/Ind/ Urban NPS/Imp	B / C	N	NPS
Cascade Brook	5	434	1337	Saco	Above	Control	B / C	N	
Cascade Brook	5	435	1338	Saco	Below	Urban NPS/ Turnpike	B / B	Y	
East Branch West Brook	6	798	1331	Biddeford		NPS	B / A (BPJ)	Y	
Emery's Brook	7	794	1354	So. Berwick		Reference	B / A	Y	
Frost Gulley	8	303	1499	Freeport	Above	NPS	A / A	Y	
Frost Gulley	8	304	1500	Freeport	Below	NPS	A / B	N	NPS
Goosefare Brook	5	271	1333	Saco	Below	Urban NPS/In- Place Contamin.	B / A	Y	
Goosefare Brook	5	337	1334	Saco		NPS/ Turnpike	B / B	Y	
Goosefare Brook	5	48	1335	Saco	Above	Control	B / C	N	
Great Works River	9	439	1355	No. Berwick		NPS	B / A	Y	
Kennebunk River	10	469	1328	Arundel		NPS	B / B	Y	
Kennebunk River	10	270	1329	Kennebunk		Urban NPS/ Turnpike	B / C	N	NPS Enrichment
Little Ossipee River	4	447	1497	Limerick		NPS	B / B	Y	
Little Ossipee River	4	446	1498	Limington		Munic/Ind/ NPS/Imp	B / C	N	NPS/Imp
Little River	11	440	1342	Lebanon		NPS	B / A	Y	
Martin Stream	12	755	1317	Dixmont	upstream	Agric NPS	A / B	N	
Martin Stream	12	756	1318	Dixmont	downstream	Agric NPS	A / B	N	
Merriland River	13	436	1324	Wells		NPS	A / A	Y	
Merriland River	13	437	1325	Wells		NPS	A / A	Y	
Mousam River	14	388	1339	Springvale		NPS	B / B	Y	
Mousam River	14	259	1340	Sanford		Urban NPS	C / C	Y	

<sup>1</sup> NPS = non-point source pollution; Munic = municipal; Ind = industrial; Imp = impoundment

**TABLE 3.2.1 - 2005 SWAT Benthic Macroinvertebrate Biomonitoring Results (cont.)**

Name	Map	Station	Log	Town	Location	Issue <sup>1</sup>	Statutory Class/ Model Class	Attains Class?	Probable Cause <sup>1</sup>
Nonesuch River	15	788	1323	Scarborough		NPS	B / B	Y	
Presumpscot River	16	72	1501	Westbrook		Munic/Ind/Urban NPS	C / C	Y	
Presumpscot River	16	802	1502	Falmouth		Munic/Ind/Urban NPS	C / B	Y	
Red Brook	15	219	1322	Scarborough		Landfill/NPS	C / C	Y	
Salmon Falls River	17	52	1356	Berwick		Municipal	C / C	Y	
Sheepscot River	18	74	1314	N. Whitefield		Reference	AA / A	Y	
Stroudwater River	15	796	1348	Gorham	above	NPS	B / C	N	
Stroudwater River	15	240	1349	Gorham		NPS/In Place Contamin.	B / C	N	
Swan Pond Brook	6	786	1327	Biddeford		NPS	B / B	Y	
Thatcher Brook	6	451	1332	Biddeford		Urban NPS	B / A	Y	
Trout Brook	19	675	1320	So. Portland	upstream	Urban NPS	C / NA	N	NPS Toxics
Webhannet River	13	438	1326	Wells		NPS/Turnpike	A / B	N	
W. Br. Sheepscot River	20	268	1315	China		Reference	AA / A	Y	
West Brook	6	797	1330	Biddeford		Urban NPS	B / C	N	NPS Toxics

<sup>1</sup> NPS = non-point source pollution; Munic = municipal; Ind = industrial; Imp = impoundment

**TABLE 3.1.2 - 2005 SWAT Nutrients and Solids Data**

Log	Waterbody	Sampling Date	DOC	NH <sub>3</sub> -N	TKN	NO <sub>2</sub> -NO <sub>3</sub> -N	OPO <sub>-4</sub>	Total P	TSS	TDS
			mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
1496	Back Brook	8/24/2005	2.0	0.01	0.1	0.15	0.004	0.011	~0.2	35
1319	Birch Stream, up	8/8/2005	5.2	0.01	0.3	0.23	0.003	0.019	~1.1	400
1341	Branch Brook	8/17/2005	1.9	0.01	0.2	0.31	0.003	0.007	~1.5	50
1337	Cascade Brook (above)	8/16/2005	8.8	0.07	0.7	0.42	0.023	0.065	~2.0	180
1338	Cascade Brook (below)	8/16/2005	8.2	0.09	0.7	0.32	0.010	0.062	5.0	270
1331	East Branch West Brook	8/15/2005	5.1	0.02	0.5	0.31	0.003	0.047	10	180
1499	Frost Gulley (above)	8/25/2005	1.9	<0.01	0.2	0.46	0.004	0.007	~0.1	220
1500	Frost Gulley (below)	8/25/2005	1.7	0.01	0.2	0.47	0.007	0.012	~0.5	250
1335	Goosefare Brook (above)	8/16/2005	3.1	0.03	1.1	0.47	0.006	0.099	~62	100
1333	Goosefare Brook (below)	8/16/2005	3.8	0.09	0.4	0.27	0.003	0.018	4.0	370
1355	Great Works River	8/23/2005	3.7	0.01	0.3	0.09	0.003	0.016	~1.0	82
1355	Great Works River DUPLICATE	8/23/2005	4.4	0.01	0.3	0.09	0.002	0.016	~0.2	88
1498	Little Ossippee River	8/24/2005	3.6	<0.01	0.3	<0.01	0.001	0.009	~0.2	31
1317	Martin Stream (above)	8/8/2005	4.6	<0.01	0.2	0.05	0.002	0.012	~1.9	80
1318	Martin Stream (below)	8/8/2005	4.3	<0.01	0.3	0.05	0.002	0.012	2.0	80
1325	Merriland River (below)	8/11/2005	7.1	0.01	0.4	0.11	0.006	0.026	3.0	86
1324	Merriland River	8/11/2005	6.7	0.01	0.3	0.12	0.008	0.024	~0.0	62
1340	Mousam River	8/17/2005	4.3	0.04	0.3	0.06	0.009	0.011	~1.1	68
1356	Salmon Falls River	8/23/2005	8.1	0.09	1.1	0.32	0.003	0.021	~0.3	~4
1349	Stroudwater River (below)	8/22/2005	2.5	0.02	0.2	0.72	0.004	0.021	2.0	88

DOC = dissolved organic carbon, NH<sub>3</sub>-N = ammonia-nitrogen, TKN = total Kjeldahl nitrogen, NO<sub>2</sub>-NO<sub>3</sub>-N = nitrite-nitrate-nitrogen, OPO<sub>-4</sub> = Ortho-phosphate, Total P = total phosphorus, TSS = total suspended solids, and TDS = total dissolved solids.